

mington and Fort Macon; in the Gulf states, they are mostly from the north; in the upper Mississippi and Missouri valleys, from the northwest; in the northern slope, from west and southwest; in the middle plateau, from northwest, and in California they are mostly northerly.

TOTAL MOVEMENTS OF THE AIR.

[In miles.]

In the following table are given the stations reporting the largest and smallest total movements of the air in each of the various districts:—

| Districts. | Stations reporting largest. | Miles. | Stations reporting smallest. | Miles. |
|-------------------------------|-----------------------------|--------|------------------------------|--------|
| New England..... | Mt. Washington, N.H. | 32,404 | New London, Conn. | 4,841 |
| Middle Atlantic states..... | Del. Breakwater, Del. | 11,571 | Lynchburg, Va. | 3,131 |
| South Atlantic states..... | Hatteras, N. C. | 12,159 | Jacksonville, Fla. | 1,493 |
| Florida peninsula..... | Key West..... | 8,765 | Cedar Keys, Fla. | 5,258 |
| East Gulf..... | Starkville, Miss. | 6,805 | Montgomery, Ala. | 4,137 |
| West Gulf..... | Galveston, Tex. | 10,999 | Little Rock, Ark. | 3,982 |
| Rio Grande valley..... | Brownsville, Tex. | 8,017 | Eagle Pass, Tex. | 4,651 |
| Ohio valley..... | Champaign, Ill. | 7,379 | Indianapolis, Ind. | 3,764 |
| Tennessee..... | Nashville..... | 5,597 | Knoxville, Tenn. | 4,545 |
| Lower lakes..... | Rochester, N. Y. | 11,190 | Toledo, Ohio..... | 6,346 |
| Upper lakes..... | Milwaukee, Wis. | 9,363 | Escanaba, Mich. | 5,529 |
| Extreme northwest..... | Moorhead, Minn. | 7,514 | Saint Vincent, Minn. | 5,152 |
| Upper Mississippi valley..... | Saint Louis, Mo. | 6,937 | Dubuque, Iowa..... | 2,492 |
| Missouri valley..... | Huron, Dak. | 6,543 | Leavenworth, Kans. | 3,993 |
| Northern slope..... | Fr. As. in. in. in. Mont. | 9,647 | Deadwood, Dak. | 1,649 |
| Middle slope..... | Fort Elliott, Tex. | 6,618 | Denver, Colo. | 2,499 |
| Southern slope..... | Fort Sill, Ind. T. | 7,660 | Fort Davis, Tex. | 4,323 |
| Southern plateau..... | Fort Grant, Ariz. | 6,395 | Silver City, N. Mex. | 2,958 |
| Middle plateau..... | Pioche, Nev. | 4,835 | Salt Lake City, Utah | 2,590 |
| Northern plateau..... | Eagle Rock, Idaho. | 4,530 | Fort Missoula, Mont. | 2,605 |
| North Pacific..... | Portland, Oreg. | 3,124 | Roseburg, Oreg. | 1,730 |
| Middle Pacific..... | Cape Mendocino, Cal. | 12,129 | Sacramento, Cal. | 3,817 |
| South Pacific..... | San Diego, Cal. | 4,699 | Visalia, Cal. | 2,249 |

* No record at Pike's Peak during the month.

HIGH WINDS.

On the summit of Mount Washington, New Hampshire, there was only one day during the month on which a maximum velocity of less than 60 miles per hour was recorded, viz.: 56 nw., 22d. The wind reached or exceeded 80 miles per hour as follows: 109 nw., 1st; 94 nw., 2d; 80 w., 4th; 92 nw., 5th; 80 nw., 6th; 90 nw., 7th; 84 nw., 9th; 90 nw., 10th; 98 nw., 12th and 14th; 84 w., 16th; 101 nw., 17th; 72 nw., 19th; 80 nw., 21st; 94 sw., 25th; 100 nw., 26th; 126 nw., 27th, maximum for month. On the 17th, the daily movement was 1,825 miles, or an average hourly velocity of 76 miles for twenty-four hours. This is the greatest daily movement ever recorded at this station.

Cape Mendocino, California, 52 se., 11th; 80 se., 12th; 78 se., 13th; 56 se., 17th.

Other stations reporting high winds are as follows: Indianola, Texas, 60 n., 17th; Galveston, Texas, 59 n., 17th; Portsmouth, North Carolina, 56 ne., 12th; Barnegat City, New Jersey, 52 nw., 12th; Delaware Breakwater, Delaware, 52 sw., 4th; Fort Elliott, Texas, 52 n., 16th; Cape May, New Jersey, 48 nw., 21st and 27th; Fort Grant, Arizona, 48 se., 19th; Rochester, New York, 48 n., 25th.

LOCAL STORMS.

Sandusky, Ohio, 14th.—At 4.45 p. m. a cloud of inky appearance was observed in the west approaching with great rapidity. Just before reaching the city the atmosphere became filled with a yellowish haze resembling the setting sun. At 4.57 p. m. the storm struck this place, accompanied by heavy rain. It was of about three minutes duration, during which time the wind blew at the rate of seventy-two miles per hour and caused great damage in and about the city. After the passage of the storm the wind backed to south and it became very warm.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for February, 1883, with the telegraphic reports for the succeeding twenty four hours, shows the general average percentage of verifications to be 89.49 per cent. The percentages for the four elements are: Weather, 89.02; direction of the wind, 90.45; temperature, 89.04; barometer, 89.47 per cent. By geographical districts, they are: For New England, 80.11; middle Atlantic states, 88.86; south Atlantic states, 90.54; eastern Gulf, 89.77; western Gulf, 92.31; lower lakes, 89.26; upper

lakes, 90.43; Ohio valley and Tennessee, 91.34; upper Mississippi valley, 88.60; Missouri valley, 84.66; north Pacific, 80.95; middle Pacific, 92.31; south Pacific, 93.75.

There were eighty-six omissions to predict (thirteen being due to absence of reports from the Pacific coast) out of 3,444, or 2.50 per cent. Of the 3,358 predictions that have been made, eighty-two, or 2.40 per cent., are considered to have entirely failed; fifty-two, or 1.55 per cent., were one-fourth verified; two hundred and seventy-eight, or 8.28 per cent., were one-half verified; three hundred and seventy-two, or 11.08 per cent., were three-fourths verified; 2,574, or 76.66 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During February, 1883, ninety-two cautionary signals were displayed. Of these, seventy-five, or 81.5 per cent., were justified by winds of twenty-five miles per hour or more, at or within one hundred miles of the station. Seventy-two cautionary off-shore signals were displayed, fifty-seven of which, or 79.3 per cent., were fully justified; sixty-five, or 93 per cent., were justified as to velocity, and sixty-one, or 84 per cent., were justified as to direction. Twenty-nine cautionary signals were changed to off-shore signals. One hundred and sixty-four signals of all kinds were displayed, and one hundred and thirty-two, or 80.4 per cent., were fully justified. These do not include signals ordered at display stations, where the velocity of the wind is only estimated. Ten signals were ordered late.

One hundred and sixteen winds of twenty-five miles or over per hour were reported, for which signals were not ordered; many of these were high local winds or strong sea-breezes.

NAVIGATION.

STAGE OF WATER IN RIVERS.

The highest and lowest stages of water observed at the Signal-Service stations, during the month of February, 1883, are shown in the following table:—

Heights of rivers above low-water mark, February, 1883.

| Stations. | Danger-point on gauge. | Highest water. | | Lowest water. | |
|---------------------|------------------------|----------------|----------------|---------------|----------------|
| | | Date. | Height. | Date. | Height. |
| <i>Red River:</i> | <i>ft. in.</i> | | <i>ft. in.</i> | | <i>ft. in.</i> |
| Shreveport, La. | 29 9 | 28 | 21 2 | 11 | 15 9 |
| <i>Arkansas:</i> | | | | | |
| Little Rock, Ark. | | 19 | 20 10 | 4 | 4 1 |
| Fort Smith, Ark. | | 17 | 14 9 | 9 | *—2 11 |
| <i>Missouri:</i> | | | | | |
| Yankton, Dak.† | 20 0 | | | | |
| Omaha, Neb.† | 10 0 | | | | |
| Leavenworth, Kans.‡ | 21 0 | 26 | 8 9 | 28 | 6 5 |
| <i>Mississippi:</i> | | | | | |
| Saint Paul, Minn.† | 14 6 | | | | |
| La Crosse, Wis.† | 18 0 | 25 to 28 | 3 4 | 19 | 2 10 |
| Dubuque, Iowa† | 21 10 | | | | |
| Davenport, Iowa† | 15 0 | | | | |
| Keokuk, Iowa‡ | 14 6 | 19 | 16 4 | 18 | 15 9 |
| Saint Louis, Mo. | 30 0 | 26 | 26 3 | 13 | 5 4 |
| Cairo, Ill. | 40 0 | 26, 27 | 52 2 | 6 | 28 11 |
| Memphis, Tenn. | 34 0 | 28 | 35 7 | 1 to 5 | 22 11 |
| Vicksburg, Miss. | 41 0 | 28 | 42 2 | 1 | 24 7 |
| New Orleans, La.† | —2 6 | 27, 28 | —3 0 | 1 | —9 1 |
| Port Eads, La. | | 16 | 10 1 | 7 to 10 | 9 2 |
| <i>Ohio:</i> | | | | | |
| Pittsburg, Pa. | 20 0 | 8 | 27 6 | 3 | 5 6 |
| Cincinnati, Ohio | 50 0 | 15 | 66 4 | 3 | 26 10 |
| Louisville, Ky. | 24 0 | 16 | 44 5 | 3 | 11 2 |
| <i>Cumberland:</i> | | | | | |
| Nashville, Tenn. | 42 0 | 13, 14 | 41 5 | 4 | 14 5 |
| <i>Tennessee:</i> | | | | | |
| Knoxville, Tenn. | | 7, 8 | 8 6 | 4 | 2 3 |
| Chattanooga, Tenn. | 31 0 | 10 | 17 7 | 5 | 7 6 |
| <i>Monongahela:</i> | | | | | |
| Pittsburg, Pa. | 29 0 | 8 | 27 6 | 3 | 5 6 |
| Morgantown, W. Va. | 28 0 | 8 | 24 4 | 24 | 4 6 |
| <i>Savannah:</i> | | | | | |
| Augusta, Ga. | | 26 | 17 0 | 18 | 7 6 |
| <i>Willamette:</i> | | | | | |
| Portland, Oreg. | | 2, 3 | 16 7 | 7 | 1 8 |
| Umatilla, Oreg.† | | | | | |
| <i>Sacramento:</i> | | | | | |
| Red Bluff, Cal. | | 14 | 2 9 | 8 | 1 4 |
| Sacramento, Cal. | | 15 | 11 8 | 11 | 9 4 |
| <i>Mobile:</i> | | | | | |
| Mobile, Ala. | | 1 | 17 4 | 19, 21 | 14 5 |
| <i>Colorado:</i> | | | | | |
| Yuma, Ariz. | | 22 | 16 8 | 1 to 4 | 15 0 |

* Below bench-mark. † Below high-water mark of 1874. ‡ Frozen the entire month. § Frozen part of month. See text.